

Intelligent Automation Incorporated

Coherent distributed radar for high-resolution through-wall imaging

Progress Report 25

Contract No. N00014-10-C-0277

Sponsored by

Office of Naval Research

COTR/TPOC: Martin Kruger



Prepared by

Eric van Doorn, Ph.D. (PI)

Satya Ponnaluri, Ph.D.

Distribution Statement A: Approved for public release; distribution unlimited.

| Report Documentation Page | | | Form Approved OMB No. 0704-0188 | | |
|--|------------------------------------|-------------------------------------|--|---|------------------------------------|
| Public reporting burden for the collection of information is estimated to average 1 hour per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to Washington Headquarters Services, Directorate for Information Operations and Reports, 1215 Jefferson Davis Highway, Suite 1204, Arlington VA 22202-4302. Respondents should be aware that notwithstanding any other provision of law, no person shall be subject to a penalty for failing to comply with a collection of information if it does not display a currently valid OMB control number. | | | | | |
| 1. REPORT DATE APR 2012 | | 2. REPORT TYPE | | 3. DATES COVERED 00-00-2012 to 00-00-2012 | |
| 4. TITLE AND SUBTITLE Coherent Distributed Radar For High Resolution Through-wall Imaging | | | | 5a. CONTRACT NUMBER | |
| | | | | 5b. GRANT NUMBER | |
| | | | | 5c. PROGRAM ELEMENT NUMBER | |
| 6. AUTHOR(S) | | | | 5d. PROJECT NUMBER | |
| | | | | 5e. TASK NUMBER | |
| | | | | 5f. WORK UNIT NUMBER | |
| 7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) Intelligent Automation Incorporated, Rockville, MD, 20855 | | | | 8. PERFORMING ORGANIZATION REPORT NUMBER | |
| 9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES) | | | | 10. SPONSOR/MONITOR'S ACRONYM(S) | |
| | | | | 11. SPONSOR/MONITOR'S REPORT NUMBER(S) | |
| 12. DISTRIBUTION/AVAILABILITY STATEMENT Approved for public release; distribution unlimited | | | | | |
| 13. SUPPLEMENTARY NOTES | | | | | |
| 14. ABSTRACT | | | | | |
| 15. SUBJECT TERMS | | | | | |
| 16. SECURITY CLASSIFICATION OF: | | | 17. LIMITATION OF ABSTRACT Same as Report (SAR) | 18. NUMBER OF PAGES 4 | 19a. NAME OF RESPONSIBLE PERSON |
| a. REPORT unclassified | b. ABSTRACT unclassified | c. THIS PAGE unclassified | | | |

1 Work performed this reporting period

1.1 Technical work performed in this reporting period

1.1.1 Radar imaging with synchronized Master and Slave nodes

In this performing period, we have focused on radar imaging with the synchronized RF link. Specifically, after synchronizing, we fix the slave node, and move the master node smoothly, collecting raw correlator output continuously. From the starting and stopping time of the master motion, and the known distance, we estimate the relative master and slave positions in 2D (Figure 1). These positions, and the correlator outputs are combined in a backprojection algorithm to form a radar image of the surroundings (Figure 2).



Figure 1. Locations of Master and Slave nodes.

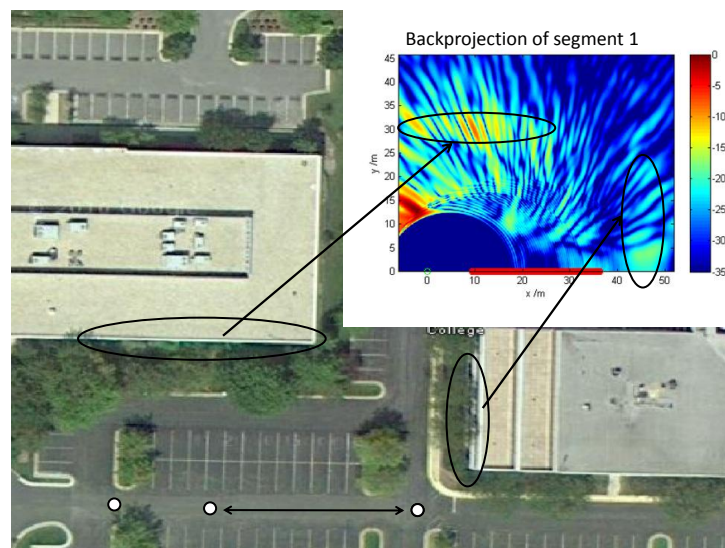


Figure 2. resulting back projection image, and identified scatterers in the image.

Naturally, the image resolution is limited by the bandwidth. We are now performing similar experiments with human intruders, to determine if a human intruder can be detected by forming an image during motion, and detect changes in the image.

1.1.2 Final Demonstration

We are preparing the final demonstration. We will demonstrate wireless synchronization, improved ranging and DF using the synchronized link, and radar imaging using the synchronized link.